O.P.Code: 20CE0111 | R20 | H.T.No.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular & Supplementary Examinations June-2024
HYDRAULIC ENGINEERING
(Civil Engineering)

Time: 3 Hours **Max. Marks: 60**

(Answer all Five Units **5 x 12** = **60** Marks)

		UNIT-I			
1	a	Prove that for a channel of circular section, the depth of flow d=0.81D for maximum velocity.	CO1	L3	6M
	b	Find the discharge though a circular pipe of diameter 3 m, if the depth of water in the pipe is 1m and the pipe is laid at the slope of 1 in 1000, Take C=70.	CO1	L3	6M
		OR			
2		In a rectangular channel 3.5 m wide laid at a slope of 0.0036, uniform flow occurs at a depth of 2 m. Find how high can the hump be raised without causing afflux? If the upstream depth of flow is to be raised to 2.5 m. What should be the height of hump? Take n = 0.015 in Manning's formula.	CO1	L3	12M
		UNIT-II			
3	a	What is hydraulic jump and derive the expression for depth of hydraulic jump.	CO2	L2	6M
	b	What is back water curve and afflux? Derive the expression for length of back water curve?	CO2	L2	6M
		OR			
4	a	A hydraulic jump forms at the downstream end of spillway carrying 17.93 m3/s discharge. If depth before jump is 0.80 m, determine the depth after the jump and energy loss.	CO2	L3	6M
	b	Write about the classification of bottom channel slope.	CO2	L1	6M
		UNIT-III			
5	a	Derive the condition for force on the inclined plate moving in the direction of the jet.	CO4	L2	6M
	b	Find the force exerted by a jet of water of diameter 75mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 20m/s.	CO3	L3	6M
		OR			
6		A nozzle of 50 mm diameter delivers a stream of water at 20m/s perpendicular to a plate that moves away from the jet at 5m/s Find (i) the force on the plate (ii) the work done (iii) the efficiency of jet.	CO3	L3	12M
		UNIT-IV			
7		A centrifugal pump discharges 0.15 m3/sec of water against a head of 12.5 m, the speed of impeller being 600 r.p.m. The outer and inner diameter of impeller are 500 mm and 250 mm respectively and the vanes are bent back at 350 to the tangent at exist. If the area of flow remains 0.07 m2 from inlet to outlet, calculate (i) Manometric efficiency of pump (ii) Vane angle at inlet (iii) Loss of head at inlet to impeller when the discharge is reduced by 40% without changing the speed.	CO5	L3	12M
		OR			

8	a	Define and explain Reynolds's number, Froude number and Mach number.	CO6	L2	6M
	b	State the Buckingham – Pi theorem	CO6	L1	6M

UNIT-V

9	a	Draw the velocity triangles, work done and maximum hydraulic efficiency of a Pelton wheel turbine.	CO4	L1	6M
	b	A jet strikes the buckets of Pelton wheel, which is having shaft power as 15450 kW. The diameter of each jet is given as 200mm.If the net head on the turbine is 400m. Find the overall efficiency of the turbine, take Cv=1.0.	CO4	L3	6M

OR

10		The following data is given for a Francis turbine. Net head=60 m; Speed=700 r.p.m; shaft power =294.3 kW; Overall efficiency=84% ;Hydraulic efficiency=93%;flow ratio=0.20; breadth ratio=0.1; Outer diameter of the runner=2x inner diameter of runner. The thickness of vanes occupies 5% of circumferential area of the runner, velocity of flow is constant at inlet and discharge is radial at outlet. Determine: (i) Guide blade angle (ii) Runner vane angles at inlet and outlet (ii) Diameters of runner at inlet and outlet and (iv) Width of wheel at inlet.	CO4	L3	12M

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